

**The Puget Sound  
Commercial Geoduck Fishery  
Management Plan**

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## Acronyms

CFR	Code of Federal Regulation
Corps	U.S. Army Corps of Engineers
CWA	U.S. Clean Water Act
dBA	decibel
DNR	Washington State Department of Natural Resources
DOE	Washington State Department of Ecology
DOH	Washington State Department of Health
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	U.S. Endangered Species Act
GMA	Growth Management Act
MLLW	Mean Lower Low Water
OSHA	Occupational Safety and Health Administration
PSP	Paralytic Shellfish Poisoning
RCW	Revised Code of Washington
SCUBA	Self Contained Underwater Breathing Apparatus
SEIS	Supplemental Environmental Impact Statement
SEPA	State Environmental Protection Act
SMA	Shoreline Management Act
TAC	Total Allowable Catch
usc	U.S. Code
WAC	Washington Administrative Code
WDF	Washington Department of Fisheries (now known as WDFW)
WDFW	Washington Department of Fish and Wildlife

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## **Introduction**

This plan, describing the state's management of the Puget Sound's commercial geoduck resources, has been prepared by the Washington State Department of Natural Resources (DNR). Although the management of the resource is a joint effort between several state agencies and the Tribes, this updated plan will focus on the goals and practices that are followed for managing the state's subtidal geoduck resources. There are also management agreements and annual harvest plans which are negotiated and signed by the state and Tribes. Separate management agreements and harvest plans are written for each of the six management regions when they are to be fished.

## **SEIS for commercial harvesting of geoducks**

In addition to the update of this management plan, a Supplemental Environmental Impact Statement (SEIS) for commercial geoduck harvesting in Puget Sound was also written In 1999/2000. The purpose of developing the supplement SEIS was to add review and assessments conducted since 1985 on the physical and biological impacts associated with commercial geoduck harvesting.

## **Resource Managers**

The geoduck fishery is jointly managed by DNR, the Washington State Department of Fish and Wildlife (WDFW), and the Puget Sound Treaty Indian Tribes (Tribes) that have a right to 50 percent of the harvestable surplus of geoducks. A December 20, 1994 U.S. district court decision by Judge Edward Rafeedie affirmed and quantified the Puget Sound Treaty Indian Tribes' right to 50 percent of the harvestable surplus of geoducks within their usual and accustomed grounds and stations. (Unites States v. Washington, 873 F. Supp. 1422 W.D. Wa 1994) (hereinafter Rafeedie decision). A subsequent federal district court order and judgement confirmed the Tribes' management role (Unites States v. Washington, 898 F. Supp. 1453 W.D.Wa 1995). The state and the Tribes are responsible for estimating geoduck population size, determining sustainable yield, and ensuring that adverse effects to the environment are kept to a minimum. DNR has proprietary rights over the state's half of the harvest and auctions the right to harvest geoducks to private companies and individuals. DNR and WDFW respectively conduct civil and criminal enforcement responsibilities for Washington state laws, regulations, and contract conditions that apply to the state's geoduck fishery.

Management of the geoduck resource is dynamic due to changes in market demand, resource economics, and new information on geoduck biology and population dynamics. This plan is intended to be a flexible document describing only the conditions and procedures under which the harvest is presently conducted. Periodic management changes will be made though the mutual consent of DNR, WDFW, and the Tribes in coordination with the industry and the public.

## Management Goals

Goals for the management of the state's geoduck program are:

- To ensure biological sustainability of geoduck populations and minimize impacts to the marine environment
- To encourage a stable and orderly harvest
- To provide maximum benefits of geoduck resources to the citizens of the state
- To minimize adverse impacts to shoreline residents
- To ensure effective enforcement of the state harvest

## Benefits of the Commercial Geoduck Fishery

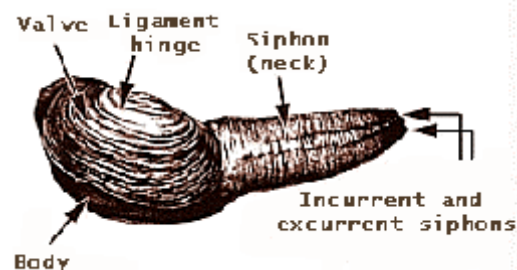
The state commercial geoduck fishery has harvested between one and two million pounds of geoducks annually over the last eight years resulting in many direct and indirect benefits. The average harvest between 1992 and 1999 was 1.6 million pounds/year. The fishery generates revenue for the citizens of the state, commercial harvesters and seafood companies, supplies food and jobs, and supports positive international trade. Between \$5-7 million are generated annually for the State.

The state revenue generated from geoduck harvest is used to help support the following state programs:

- clean up and restoration of contaminated sediment in the Puget Sound,
- inventory of nearshore aquatic habitat in the Puget Sound,
- control of the invasive aquatic weed spartina,
- geoduck fishery management and harvest enforcement programs
- state/tribal shellfish negotiations
- operating and capital improvement monies for Washington's Department of Fish and Wildlife including intertidal shellfish enhancement, and
- grants to local governments for the purchase, development and restoration of aquatic lands for public access and salmon habitat restoration.

As a steward of state-owned aquatic lands, DNR has a legal obligation to protect and regulate use of the state's aquatic lands. Maintaining healthy ecosystems is paramount to the success of water-oriented businesses, recreation, and quality of life. Hazardous wastes and cumulative effects of human activity on aquatic resources are a real danger to aquatic flora and fauna.

Figure 1. The Geoduck



Clam (*Panopea abrupta*)

## **Resource and Harvest Background**

### **Distribution and Abundance**

Geoducks are found in North America from Alaska to California, with abundant populations in many of Washington's inland marine waters. Commercial beds are present in southern and central Puget Sound, Hood Canal, Admiralty Inlet and, to a lesser extent, in the Strait of Juan de Fuca, northern Puget Sound and the San Juan archipelago. Geoducks range from the low intertidal zone to at least 360 feet in water depth. Geoducks are the world's largest burrowing clams, averaging 1.9 pounds each in Puget Sound, but size and density vary geographically. They are larger and more numerous in southern Puget Sound compared to northern Puget Sound.

Geoducks are patchy in their distribution. The patchiness may be partly due to substrate type and/or food availability. Geoducks are found in a variety of substrates, but are most abundant and largest when growing in sand or mixtures of sand, silt, and gravel. The average pre-fishing density on all identified commercial tracts statewide is 1.7 geoducks per square meter although in some small areas densities are as high as 22.5 clams per square meter. Average density in southern Puget Sound, central Puget Sound, and Hood Canal is 1.9 geoducks per square meter. Geoduck density is directly related to water depth between zero and 25 meters. Size, however, is inversely related with water depth.

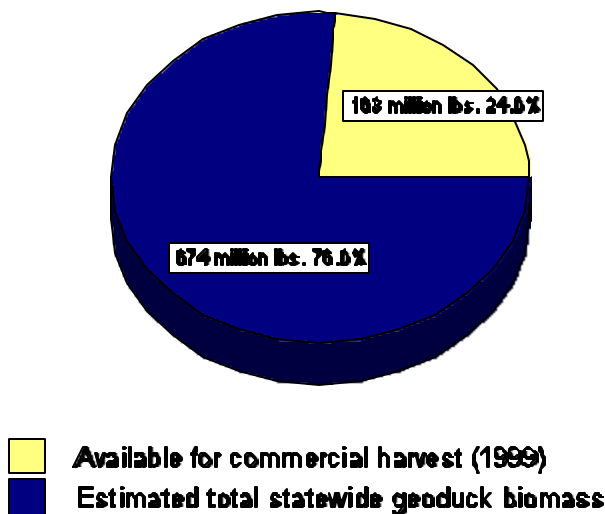
State (and Tribal) harvest is limited to specific beds which:

- Have geoducks in commercial quantities (normally greater than 0.04 geoducks per square foot within the -18 (corrected to MLLW) and -70 foot harvest depth zone.
- Are certified for harvest by the Washington Department of Health
- Have complete biological surveys and environmental assessments
- Contain market quality geoducks (dependent on size and meat color) and present no practical difficulties for harvest.
- Do not conflict with existing uses such as ferry routes, etc.
- Do not conflict with fish spawning and migration

In 1999, the total geoduck biomass in surveyed Washington tracts considered suitable for commercial harvest was estimated to be 163 million pounds. Other geoduck biomass that cannot be considered commercial due to pollution, an uneconomically low density of geoducks, or other miscellaneous problems totals about 57 million pounds. The total geoduck population in Washington in all water depths and locations is much greater than the surveyed population of 220 million pounds within the -18 (corrected to MLLW) to -70 foot depth range. Large numbers of geoducks are known to occur inshore and offshore of the legally fishable depths, and by summing the above estimates, the total geoduck biomass in Washington in 1999 is estimated to be about 674 million pounds, of which 24 percent (163 million pounds) is presently considered to be the commercial biomass from which allowable fishery impacts are calculated.



**Figure 2: Commercial Geoduck Resources**



(Note: of the 163 million pounds referenced above, the state harvested 1%, (1.8 million pounds) in 1999. The state harvest for the last eight years has averaged 1.6 million lbs./year)

## Life History

Geoducks grow rapidly and can reach an average harvestable size of 1.5 pounds in four or five years. Geoducks usually attain their maximum size (shell length of 150 mm, or about 6 inches) and weight (up to 14 pounds) within 15 to 25 years, but some may live as long as 140 years. They reproduce by releasing their sperm and eggs into the water column where fertilization occurs. They spawn primarily from April to June, when increased water temperatures and plankton blooms trigger the release of eggs and sperm. The microscopic larvae drift with the currents for a period of up to 47 days during which the young may be carried by water currents many miles. The larvae then settle to the bottom and metamorphose into non swimming juveniles and burrowing into the substrate, usually down to two or three feet by the time they are between three and five years old.

## Puget Sound Harvest

The commercial geoduck harvest began in Washington state in 1970 following the discovery of extensive subtidal populations, but at that time the market demand was limited. Demand grew significantly, however, with the establishment of a major new market in Japan. By 1980 harvesting continued to increase, as additional domestic markets developed for whole live geoducks, especially in Asian communities, and processed geoducks. Markets continue to vary with foreign competition, foreign exchange rates, and the supply of geoducks, but today the geoduck fishery is the largest and most economically important clam fishery on the west coast of North America.

## **Harvest Gear and Methods**

To harvest geoducks, commercial divers use water-jets to loosen the substrate immediately around the clam which allows removal by hand. The water-jet is a nozzle about 18 inches long with a 5/8-inch diameter tip at the digging end and a shut-off valve on the other. After the diver locates the clam by its "show" (siphon extended out of the substrate) or by feeling for the depressions it leaves in the substrate, the nozzle is inserted next to the exposed geoduck siphon, or in the hole which is left when the siphon is retracted. A short burst of water, with a pressure of 40 to 60 pounds per square inch, liquefies the sediment allowing individual geoducks to be easily removed. A diver using this method can often harvest 1,500 pounds per day (approximately 800 clams) on a good tract.

Figure 3. Water jet used to harvest geoducks

(Figure 3 is not available electronically)

Divers operate from anchored boats, normally 25 to 60 feet long. Pumps and compressors on the boat provide divers with air to breathe through hoses that are up to 400 feet long as well as pressurized water for the water-jet nozzle. Boats have one or two harvest divers in the water at the same time. A tender stays on board to monitor pumps and compressors and to haul harvested geoducks aboard. The tender and divers are in constant contact via an underwater communication system. The harvested geoducks are weighed and reported on shellfish receiving tickets in the presence of DNR staff, and then unloaded at a pre-approved marina or boat ramp. They are then transported to a processor or market.

## **Harvest Allocation**

The Total Allowable Catch (TAC), expressed in total weight of geoducks, represents the total allowable fishing related mortalities that may occur in a given year. Currently, separate TACs are calculated for each of the geoduck management regions on an annual basis. The TAC for a region is the product of two numbers: the estimated biomass within surveyed commercial tracts in the region, and the recommended harvest rate.

Biomass is estimated by dive surveys on individual commercial tracts within the region. Regional biomass

estimates are the sum of all surveyed commercial tract estimates within the region. Tract estimates are adjusted annually whenever a tract is surveyed (adding biomass) or commercially harvested (subtracting biomass). Whenever a tract is fished, the known weight of the catch is subtracted from the tract's biomass estimate; this adjusted biomass estimate is used until the tract is re-surveyed.

The recommended harvest rate is the proportion of the commercially biomass that can be allocated to total annual fishing mortality and is determined based on predictions of mathematical yield models which forecast the long-term consequences of various harvest rates on geoduck populations. Such models rely on estimates of growth, natural mortality, sexual maturity, harvest selectivity and other life history parameters to make their long-term predictions.

Based on this model, an annual harvest rate of 2.7% in each region was agreed to by state and Tribal managers in 1997. The 2.7% harvest rate is predicted to preserve 40% of the un-fished spawning potential of the population, a risk-averse policy now widely used by federal fisheries managers. The TAC within a region changes annually with changes in the estimated commercial biomass; net increase in biomass (newly surveyed areas, for example) will result in a increased TAC, while a region with a net decrease in biomass (due to harvest, or loss of tracts from pollution, for example) will have a reduced TAC. The TAC could also change if the managers identified a need to modify the harvest rate or fish in areas other than the present -18 ft. MLLW to -70 ft. uncorrected.

To ensure that the catch is distributed throughout Washington, TACs are annually calculated by region, i.e., no more than 2.7% of the commercial biomass estimated in each of management regions is allocated to allowable total fishing related mortality each year.

## **Authorities**

All subtidal lands in the state, and the living resources embedded in them, are owned by Washington State and managed by DNR. The geoduck resources were so vast that in 1969 DNR and the former Washington Department of Fisheries (now WDFW) jointly petitioned the Legislature to open the waters to commercial geoduck harvest. The Legislature did so, with revenue from the sales of geoducks to fund protection of aquatic resources and management of the geoduck resource. The Rafeedie decision affirmed the Puget Sound Treaty Indian Tribes' right to 50 percent of the harvestable surplus of geoducks within their usual and accustomed grounds and stations and defined cooperative management requirements for state and treaty Tribes for shellfish resources, including geoducks. DNR, WDFW and the Tribes manage commercial geoduck harvest on a regional basis.

## **Department of Natural Resources**

Mandated by WAC 332-30-100, DNR seeks a balance of public benefits from use of aquatic lands. Benefits include fostering water-dependent uses, ensuring environmental protection, encouraging public use and access, utilizing renewable resources, and generating revenue. DNR has proprietary rights over the state's geoduck resources, determine beds for harvest and auctions the right to harvest geoducks to private companies and individuals. The DNR harvest agreement contract is the legal document that binds the state

with the private non-Indian harvester (RCW 79.96.080). The Department marks the tracts, appraises the resource value, schedules and supervises an on-site test harvest, conducts the public auction, and conducts enforcement of contract provisions and other applicable laws regarding geoduck harvests. DNR enters into a biennial contracts with WDFW to partially fund activities for managing geoduck resources. Further details on DNR's roles are discussed in subsequent sections of this management plan.

## **Department of Fish and Wildlife**

RCW 75.08.012 mandates that WDFW shall preserve, protect, perpetuate and manage the food fish and shellfish in state waters and offshore waters. Proceeds from geoduck harvest fund the work performed by WDFW for the geoduck fishery. WDFW performs biological stock assessments of the commercial geoduck resource, calculates, and recommends the annual TAC for each geoduck management region, and monitors the effects of harvest on the geoducks, the substrate, and the associated flora and fauna. WDFW also enforces the laws and regulations regarding geoduck harvest.

## **Tribal Managers**

The Rafeedie decision confirmed the Puget Sound Treaty Indian Tribes to 50 percent of the geoducks in their usual and accustomed grounds and stations.. As a result, the Tribes, DNR and WDFW cooperatively manage the subtidal geoduck fishery. The Tribes, along with the state managers are responsible for estimating geoduck population size, determining sustainable yield, and ensuring that adverse effects to the environment are minimized. Tribal governments are responsible for enforcing their individual fishery regulations. The following tribes have treaty rights to harvest geoducks: Squaxin Island, Nisqually, Puyallup, Tulalip, Muckelshoot, Skokomish, Port Gamble S'Klallam, Suquamish, Jamestown S'Klallam, Lower Elwha S'Klallam, Swinomish, Nooksack, Lummi, Makah, and Upper Skagit.

## **Other state agencies**

Various other agencies have a responsible role in the management of the geoduck fishery. The Department of Health (DOH) ensures that the clams are safe for human consumption by monitoring the state's shellfish growing waters and prohibiting harvest in polluted waters. A tract without DOH certification will not be authorized for harvest. DOH also monitors paralytic shellfish poison (PSP), known commonly as "red tide". Shellfish containing over 80 micrograms of toxin per 100 grams of shellfish tissue cannot be harvested or sold for human consumption. Regular ambient water quality monitoring by DOH provides an early warning of declining water quality well before it has actual adverse biological impact on fish or shellfish.

The Department of Ecology (DOE) has broad responsibilities, including enforcing noise and water quality standards, protecting the water from pollution and administering the Shoreline Management Act (SMA) and the State Environmental Policy Act (SEPA).

Some geoduck tracts occur adjacent to state parks, so DNR works in cooperation with the State Parks and Recreation Commission in preparing management plans for aquatic lands adjacent to these parks. These plans guide aquatic land use, including commercial geoduck harvests. To avoid any conflict with recreational boaters near these parks, a buffer zone is placed around the park, in which geoduck harvesting

is prohibited.

## **Federal Agencies**

Several federal agencies are involved in approval and siting of geoduck harvest tracts. Harvest near federal wildlife refuges, military facilities, military operation areas, or federal prisons must be consistent with those agencies' management plan.

DNR also cooperates with the Occupational Safety and Health Administration (OSHA) in the U.S. Department of Labor by notifying the agency of where harvesting will occur, and providing access to the industry so that OSHA can perform safety inspections to assure that all members of the industry are in compliance.

## **Local Government**

Local governments play a major role in management of shorelines and aquatic lands within their jurisdiction. Under the SMA guidelines, each county develops its own Shoreline Master Plan (approved by DOE) for control of development. These plans can resolve conflict between competing uses and protect water quality at geoduck beds. Three jurisdictions within Puget Sound currently require shoreline permits for harvesting off of their shores: Kitsap County, Island County, and the City of Bainbridge Island. The other counties have exempted commercial geoduck harvest from shoreline permit requirements.

## **Legal Framework Associated With the Harvest Program**

Commercial geoduck harvesting is ultimately governed by several statutes, regulations, and permits. Generally, commercial harvesting in state owned waters is governed by laws that can be subdivided into three areas: the environment, the public and property owners, and aquatic lands (see Table 1 and 2):

**Table 1. Summary of General Harvesting-Related Statutes and Laws**

<b>Environmental Protection</b>	
<b>RCW 43.21.C</b> <b>WAC 197-11</b> State Environmental Policy Act (SEPA)	Requires proof the proposed facility will not have a significant adverse environmental and social impacts through completion of an environmental checklist prior to state or local approval. An environmental impact statement may be required if there are probable significant environmental impacts.
<b>RCW 90.58</b> Shoreline Management Act (SMA) 1971	Protects shorelines and assures orderly development.
<b>WAC 173-225</b> Clean Water Act (CWA) Section 401	Protects water quality.
<b>Benefits to the Public</b>	
<b>RCW 36.70</b> Growth Management Act (GMA)	Outlines land-use planning and regulates development in response to rapid growth challenges.
<b>RCW 79.68.080</b> Multiple Use Concept in Management and Administration of State-owned Lands 1971	Requires Department of Natural Resources (DNR) to allow both commercial and recreational use of state-owned land and water for the production of food, fiber, income, and public enjoyment.
<b>Aquatic Lands</b>	
<b>RCW 79.90</b> Aquatic Lands Act 1984	Requires DNR to work toward providing a balance of public benefits concerning state-owned aquatic lands.
<b>WAC 332-30</b> Aquatic Lands Management	Gives water-dependent users preference over other uses of aquatic lands.
<b>RCW 75.08.080</b> Scope of WDFW Commission's authority to adopt rules	The WDFW Commission may adopt, amend, or repeal rules specifying times, areas, gear used, disposal, quantities, etc. concerning food fish or shellfish harvesting.

<sup>1</sup>**Table 2. Summary of Statutes and Policies Specific to Commercial Geoduck Harvesting**

<b>RCW 79.96.085</b> Geoduck Harvesting--Designation of aquatic lands	DNR shall designate areas of state-owned lands that are available for commercial geoduck harvesting.
<b>RCW 75.08.012</b> Mandate of the Department of Fish and Wildlife.	WDFW shall preserve, protect, perpetuate and manage the foodfish and shellfish in state and offshore waters, and conserve the food fish and shellfish resources in a manner that does not impair the resource. In a manner consistent with this goal, the department shall seek to maintain the economic well-being and stability of the fishing industry in the state. WDFW shall promote orderly fisheries and shall enhance and improve recreational and commercial fishing in this state.
<b>WAC 220-52-018</b> Clams – Gear	Shellfish for commercial purposes may be harvested with a pick, mattock, fork or shovel operated by hands, except that permits for the use of a mechanical clam digging device to take clams other than geoducks may be obtained from the director of fisheries subject to some conditions.
<b>WAC 220-52-019</b> <b>RCW 75.24.100</b> Geoduck clams, commercial harvesting --Unauthorized acts	Geoducks for commercial purposes may not be taken from outside the harvest area designated in current DNR geoduck harvesting agreement, or from between areas shallower than eighteen feet below mean lower low water (0.0. ft.), or the line of ordinary high tide (mean high tide) and a line two hundred yards seaward from and parallel to the line of ordinary high tide.
<b>WAC 220-52-01901</b> Geoduck licenses	A geoduck fishery license issued by the WDFW director is required for the commercial harvest of geoduck clams.
<b>RCW 75.28.010</b> Commercial licenses and permits required --Exemption  <b>RCW 75.28.750</b> Geoduck diver license.	All of the following require a license or permit issued by the WDFW director: commercial shellfishing, delivery of shellfish taken from offshore water, operation of a charter boat or commercial fishing vessel engaged in a fishery, processing or wholesaling shellfish.  Every diver engaged in the commercial harvest of geoduck clams shall obtain a nontransferable geoduck diver license
<b>RCW 75.30.280</b> Geoduck fishery license--Conditions and limitations--OSHA regulations--Violations	A geoduck fishery license is required for commercially harvesting geoduck clams. The WDFW director shall determine the number of geoduck fishery licenses that may be issued for each geoduck harvesting agreement, the number of units of gear whose use the license authorizes, and the type of gear that may be used. In making those determinations, the director shall seek to conserve the geoduck resource and prevent damage to its habitat.
<b>RCW 79.96.080</b> Geoduck harvesting--Agreements, regulation	Geoducks shall be sold as valuable materials under the provisions of 79.90 RCW. After confirmation of the sale, DNR may enter into an agreement with the purchaser for the harvesting of geoducks, where DNR may place terms and conditions in the harvesting agreements, and enforce the provisions of any agreement.

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<sup>1</sup> WDFW RCW's have been recodified. The revisions were not available for inclusion in the Management Plan

## Management of Commercial Geoduck Resources

Annual harvest management agreements are negotiated and signed by the managers of the resource for each management region. These plans establish guidelines and provisions governing the management and annual harvest of geoducks.

### Tribal Management

Although the Tribes are co-manager of the commercial geoduck fishery, and management decisions are a cooperative effort, the Tribes are not governed under statutes of the State. For this reason, management of the Tribal fishery is planned in cooperation with the State's management, yet accomplished independent of Washington's statutory authority.

The Tribes and the State currently harvest seaward of the -18 ft. depth corrected to mean lower low water (MLLW) and shoreward of -70 ft. uncorrected. However, these areas must be surveyed and opened to harvest based on biologically appropriate criteria, and agreed upon by all managers of the resource. Tribal harvest is not restricted to 200 yards from shore, as are the State harvesters. The tribes also use the sustainable harvest rate and harvest quota agreed upon by all of the managers. The Tribes are responsible for having an authorized Tribal official present to weigh and record the daily catch of all Tribal harvesters. In addition, other geoduck fishery management guidelines and provisions are agreed to by the state and Tribes in annual, regional management plans that also similarly affect management actions.

### State Biological Management Policies

The preservation, protection and perpetuation of the state's geoduck resources is mandated to WDFW. WDFW studies the biology, ecology, and population dynamics of the geoducks. The Director of WDFW may limit the amount of fishing effort, methods, and gear in order to protect the resource, its habitat and to achieve sustained yields. The Director may also set limits to prevent waste, destruction or permanent damage to the bottom or adjacent shellfish populations.

WDFW and DNR determine where and when to conduct pre-harvest surveys and environmental assessments of the clam resources and surrounding habitat before geoduck beds can be harvested. Geoduck surveys must be completed within eight years of a tract being open for fishing or a new survey is required. All stock assessment survey work is conducted according to the protocol described in Stock Assessment of Subtidal Geoduck Clams (*Panopea abrupta*) in Washington (1999). Environmental assessments are conducted for state tracts during the preharvest surveys. Tracts are inspected for important fish habitats, and the presence of different species of marine fish are noted on a transect-by-transect basis. These data are included in Environmental Assessments. The area proposed for harvest is reviewed internally by WDFW fishery, habitat, and wildlife biologists. Other county, state and federal agencies are consulted, as are tribal representatives. These biologists review the proposed harvest sites on a site-by-site basis and identify potential conflicts. If spawning areas, or other important habitats are present, these areas may be closed to harvest or closed seasonally during spawning periods or other critical times. Based on commercial geoduck biomass for relevant tracts, WDFW calculates the annual sustainable fishing related mortalities for each management region.



Once all managers agree that a tract has been adequately fished down, state and Tribal managers may choose to conduct post-harvest surveys on fished tracts. Post harvest surveys could be used to empirically verify changes in geoduck density following completion of fishing, to assist in verifying landings reported on fish receiving tickets or monitor logs, to monitor the compliance with harvest management agreements, and to establish a baseline density level for estimating recovery of geoducks and other benthic plants and animals. The purpose, need and protocol for conducting post harvest surveys will be developed by state and Tribal managers. Once the mean pre-fishing density is reached on a given bed, the bed will again be eligible for commercial harvest. Geoduck tracts that are in recovery status are not harvested during this recovery period.

Data collected from the pre- and post-harvest surveys are compiled into an annual Geoduck Atlas published by WDFW. It provides the general location of all known geoduck tracts confined to the -18 foot (corrected to MLLW) and -70 foot depth contours. All new beds discovered are added to the Atlas along with documentation of changes due to fishing, changes resulting from DOH certification, results of bed re-surveys, etc. The biomass and average geoduck density estimates for tracts being fished are revised annually by WDFW in the Atlas to reflect the annual harvests that have occurred and to document the basis for computing annual TACs. Once a tract is fished down, the reported biomass will be the pre-fishing biomass estimate minus the total harvest amount.

## **State Economic Management Policies**

By state policy, DNR is mandated to sell geoducks as valuable materials, and enters into an agreement with the purchaser for the harvesting of geoducks. DNR may also place terms and conditions in the harvesting agreements, and enforce the provisions of any agreement.

A DNR economist determines the appraisal value of the geoduck resource by examining factors such as market value, processing and shipping costs, etc. DNR schedules and supervises an on-site test harvest with interested purchasers before it auctions rights to harvest. The test harvest provides independent confirmation of the quality and quantity of geoducks in the harvest area. The test harvests last one day per bed and each company can remove up to 500 pounds of geoducks. DNR then conducts sealed bid public auctions and identifies the highest responsible bidder for each quota on a tract. Purchasers enter into a contract with DNR, and a bond is in force for each quota. During harvest, charges for the removal of geoducks are billed every two weeks, with payment due within ten business days of the date the bill is sent.

## **Harvest Operational Restrictions**

To ensure protection of the resource and the environment, management practices must be compatible with effective resource monitoring measures. The following are current management practices carried out by DNR:

## **Location of Harvest**

- Harvest is permitted only from tracts designated through contract by DNR.
- Harvest is permitted only during business hours from 8:30 a.m. to 4:30 p.m. with no harvest permitted on Saturdays. State policy prohibits harvest on Sundays, or state holidays (WAC220-52-019).
- Areas opened for harvesting are set apart and marked with easily identifiable stakes and/or buoys
- Latitude and longitude positions recorded for all markers.
- Non-Tribal commercial geoduck harvest takes place in a clearly defined area-between -18 feet (or 200 yards from shore, whichever is furthest) seaward to points no greater than -70 feet in uncorrected depth. The inner harvest boundary minimizes impacts to sensitive nearshore habitats like eelgrass beds. The outer boundary is the limit at which divers can effectively operate without extensive decompression. Tribal and State harvesters maintain the option to harvest shallower than -18 feet corrected to MLLW and greater than -70 ft. uncorrected depth. These areas, however, would need to be surveyed and opened to harvest based on biologically appropriate criteria..
- No harvest occurs in eelgrass beds or eelgrass buffer zones. Eelgrass beds and necessary buffer areas shall be determined, marked and excluded from the designated harvest area prior to harvest. The minimum shoreward boundary of the tract is the - 18 feet MLLW depth contour.
- The seaward boundary is at -70 feet uncorrected depth. On tracts where an eelgrass bed extends deeper than -16 feet MLLW the shoreward boundary of the tract will be two vertical feet deeper and seaward of the deepest occurrence of eelgrass. Alternatively, a buffer zone of at least 180 feet around eelgrass beds deeper than -18 feet MLLW is used.
- Herring spawning populations could be negatively impacted by geoduck harvesting. In order to protect herring populations, harvest is restricted in areas of known herring spawning activity. The Tribes and the State will adjust the closure periods if herring stock information suggests a different management action is necessary to protect the herring spawning population.
- Geoduck harvest will not be allowed during the spawning period of other important fish such as Pacific cod or English sole in areas known to be used for spawning.
- For any areas where "take" of a species listed as "threatened" under the federal endangered Species Act (ESA) is a possibility, measures will be employed to avoid the "take", or an authorization for incidental take will be obtained from the National Marine Fisheries Service under ESA rules.

## **Harvest Operations**

Commercial geoduck harvest shall be conducted by divers with a hand-held, manually operated water jet. The water jet nozzle shall not exceed 5/8 inch inside diameter. Each geoduck must be excavated individually from the bottom. The practice of "side-mining" is prohibited in areas where the bottom slope is steep.

Under terms of the DNR harvest agreement, all non-Indian geoduck vessels must operate with noise levels of less than 50 decibels (dBA) measured at 600 feet from the source. The state noise standard for residential areas is 55 dBA (WAC 173-60-040). Vessels found to exceed 50 dBA are suspended from harvest until the vessel is brought into compliance.

Vessel operators are required to have DNR tract maps, sight-line photographs and copies of harvest agreements

on board the harvest vessel when harvesting. All geoduck harvest vessels must clearly display their assigned WDFW identification numbers.

## **Harvest Quantity**

The current fishery season quotas are based on an annual harvest rate of 2.7% of the total commercial biomass in the Puget Sound region. The 2.7% harvest rate was calculated using the age based equilibrium yield described in the WDFW publication Stock Assessment of Subtidal Geoduck Clams (*Panopea abrupta*).

- When geoduck are damaged during harvest or handling, and weight loss is suspected, the whole body weight will be estimated by applying a correction factor.
- Simultaneous harvest of other species while harvesting geoducks is prohibited by non-Tribal harvesters
- Currently tracts are open for harvest from 2 to 4 months. Multiple harvest sites are concentrated around the same area so as to assure adequate enforcement efforts and mitigate impacts to shoreline residents.
- Landing of harvested geoducks is restricted to sites approved and authorized by DNR

## **DNR Compliance Enforcement**

During all commercial geoduck harvesting, a DNR enforcement vessel is present at the site with the exception of emergencies and operational requirements. DNR enforcement personnel maintain direct oversight of the fishery to ensure that WDFW laws and regulations and DNR contract conditions are followed. DNR harvest agreements provide that violations of any provision, including WDFW regulations, may result in civil fines and possible suspension or termination of the harvest agreement.

Within a given management region, tracts selected for harvest by non-Indian divers are typically concentrated into a single geographical area to facilitate enforcement.

## **Weigh out**

All harvested geoducks are to be weighed on the water at the harvest tract or, due to exigent circumstances, at a previously designated offload site that is reasonably available to all parties. All daily non-tribal weight-outs are witnessed by DNR enforcement staff. The daily catch weights are recorded on official fish tickets and submitted to WDFW.

## **DNR Dive Program**

There are three main priorities of this program: enforcement of the laws and regulations of the geoduck fishery, maintenance of the geoduck tracts, and underwater enforcement surveys of the harvest area. All DNR enforcement personnel are certified commercial divers and trained to use both SCUBA and surface supplied air. The compliance staff do weekly dives in the areas where harvesting is occurring to monitor for violations of harvesting agreements.

## **Geoduck High-Grading, Wastage and Poaching**

High grading refers to an attempt by the harvester to judge the quality and size of a geoduck prior to removal from the substrate. This determination is made by either visual observation or physical touch.

Wastage is the deliberate discard of resource after it has been excavated from the substrate. This can either occur by the diver underwater or by the tender topside on the harvest vessel. Underwater wastage occurs when the product is then either left on the bottom or is re-inserted back into the hole left by its extraction. Topside wastage on the harvest vessel is conducted in most cases by the tender, and occurs during the packing and sorting of the resource. Poor quality or damaged geoducks are either thrown overboard or placed into separate containers for disposal at a later time.

Inadvertent mortalities also can occur as a normal part of harvest operations, e.g., clams might miss a divers's bag or not be found after extraction. This type of wastage is usually minimal and is affected by diver experience, conditions, and speed of harvest operations. As with other wastage and poaching, inadvertent wastage is a portion of the total allowable fishing mortality represented by the TAC.

Inspections of both the harvest areas and harvest vessels are conducted by DNR staff on a routine basis in order to deter and reduce wastage that could occur on state monitored harvest areas. Department divers conduct investigative dives to check for wastage and other harvest violations, and enforcement crews perform vessel inspections and on water weigh outs in order to reduce the opportunity for wastage. If wastage or any harvest violation occurs both criminal and civil penalties can be sought against the responsible harvest company and harvester by WDFW and DNR respectively.

Poaching is an illegal harvest of geoduck in areas that are not authorized for harvest by DNR (through contract) or the Tribes (through tribal regulation) and recognized under an annual State/Tribal management plan. WDFW and Tribal law enforcement programs are responsible for investigating and prosecuting poaching violations when they are discovered.